Parity-specific fertility and post-reproductive premature mortality: A comparison of the German Democratic Republic and Sweden

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Abstract

Most population-level evidence on the link between the reproductive history of women and their post-reproductive mortality is based on high-income countries with population registers. Here we enhance the existing population-level evidence by analysing data that was collected as part of the population register of the Communist German Democratic Republic (GDR). A comparison with Sweden will allow us to explore whether the link between fertility outcomes and post-reproductive mortality differs dependent on the political and economic context. First findings for the East German GDR show that mortality differences by number of children born are more attenuated than in other countries. This seems to be mostly driven by deaths due to neoplasm and external causes. For cardiovascular diseases and other causes, however, we identify a typical j-shaped pattern where women with two children are displaying the lowest mortality. Over the next months, we will specify a similar model for Sweden, allowing us to present at the EPC a direct comparison between East Germany and Sweden.

Introduction

Most population-level evidence on the link between the reproductive history of women and their post-reproductive mortality is based on countries with long-standing population registers (e.g., Grundy and Kravdal 2010; Barclay et al. 2016). These countries are at the same time usually characterised by high levels of economic development and well-developed health care and social security systems. Here we make use of a unique data source that allows us to enlarge the variety of countries for which such research has been conducted. In the 1980s, the mortality registration of the German Democratic Republic (GDR) included for women information on the total number of live births they ever had. In addition, the census of 1981 collected for the total population information on the number of children ever-born alive. This allows us to conduct survival analyses to explore the link between parity-specific fertility outcomes and cause-specific mortality. In this extended abstract we present first outcomes for the German Democratic Republic, to which we will also refer to as East Germany. For the EPC we will provide a comparison with Sweden.

A comparison between East Germany and Sweden is fruitful for several reasons. They are almost neighbouring countries, facing each other in the western part of the Baltic Sea area. Both countries have a Protestant tradition, parts of East Germany had even belonged to Sweden for some time in early modern times. In addition, East Germany and Sweden also shared in the second half of the 20th century many similarities in terms of the fertility trends. In both countries, the transition to first birth became almost universal among the observed cohorts born between 1915 and 1936 (Sobotka 2017). In East Germany, around 16% were childless among the 1915 cohort. This increased to 18% among the cohorts born in the early 1920s, before it declined to 10% among the cohorts born in the mid-1930s. In Sweden, the decrease was rather continuously from 24% to around 12% across the cohorts born between 1915 and 1936 (Sobotka 2017). In both countries, fertility trends were characterised by rollercoaster patterns (HFD 2023). In addition, both countries were forerunners in the rise of non-marital childbearing in Europe (Klüsener et al. 2013). As to the welfare system, both East Germany and Sweden developed after World War II large social welfare systems. However, the two countries differed substantially in their political and economic systems. GDR was a dictatorship with a planned economy, while Sweden was and continues to be a democracy with a liberal market economy.

Our main research questions are as follows: Do we find similar patterns in the link between fertility outcomes by parity and premature cause-specific mortality between East Germany and Sweden? If we find these differences, can they be linked to the specific communist context of East Germany in the late 1980s?

Background

Existing research shows that selection effects play a strong role in determining the total number of children (Barclay et al. 2016). Childlessness can also be linked to health issues which might also have implications for premature mortality. Having one or two children, on the other hand, is in modern societies rather a behaviour "within norms". To have three or more children, on the other hand, is again a quite socially select behaviour that with some exceptions is rather associated with lower SES (Brzozowska et al. 2022) that tend to have higher mortality (Wenau et al. 2019). As a result, existing studies usually find a j-shaped or u-shaped association between the number of children born and post-reproductive mortality. However, particularly for mothers with more than two births the relationship varies quite substantially across countries (e.g. Barclay et al. 2016, Hurt et al. 2006; Hank, 2010). When differentiating mortality by cause of death, we follow an earlier study by Barclay et al. (2016) by looking at neoplasm, diseases of the circulatory system, external causes and all remaining causes.

Data and Methods

We use a 100% individual-level sample of the GDR census of 1981, and the complete mortality register data for the years 1982-1990. Both datasets include information on the birth year and the number of children born alive. Access to these two datasets was provided by the German State Archive. Initially, these two data sources were linked through personal identification numbers, as the GDR census of 1981 marked the establishment of a population register in East Germany. However, these personal identification numbers were removed after German reunification in order to comply with data protection regulations. We thus apply a probabilistic linkage procedure, which allows us to derive for the attributes birth year and number of children born alive almost a 100% match (see below for details). To make the ICD 9-East classification of East Germany compliant with ICD-10 coding, we rely on earlier work by Grigoriev and Pechholdová (2017). We focus on cohorts that had reached the end of their reproductive period by 1981 (cohorts 1915-1936), which are aged 46-75 in the follow-up period until the dissolution of the GDR in 1990. This implies that we focus on premature mortality.

We apply Cox proportional hazard models (Cox, 1972), using women with two children as the reference group. As we are not able to link the census with the mortality follow-up data through a personal identification number, we had to take a decision how to treat the issue of international migration. Here we benefit from the situation that international migration from and to the German Democratic Republic was very limited in the 1980s. In addition, we analyse age groups in which international migration is generally rather low (Raymer and Willekens 2008). We thus apply a zero-migration assumption. This implies that we do not believe the international migration from and to East Germany to have strong effects on our models. Thus, the exposure time of observed individuals begins at census (31.12.1981) and we link the mortality follow-up data by birth year and parity with the initial population as recorded in the census. This allows us to identify based on our zero-migration assumption the number of women by birth year and parity for whom we do not observe a death. These are censored at the day before German reunification (2nd of October 1990). In the models by cause of death, we censor women at death when they die of another cause. Over the next months, we intend to also run consistency checks with competing risk models.

First Results and Outlook

Our first results for East Germany show that we also identify a kind of u-shaped relationship for all-cause mortality, with women with two live births displaying the lowest mortality risks (Fig. A1). However, the East German pattern seems to be more attenuated compared to outcomes for other countries. For deaths due to neoplasm, we expected to find elevated neoplasm risks among childless women, as they tend to have higher risks of breast cancer. Related to this it is relevant to note that smoking prevalence was very low among East German women at that time, so that lung cancer played a less dominant role (Grigoriev et al. 2022). However, contrary to our expectations, childless women have actually the lowest risk to die of neoplasm (Fig. A2). Only women with parity 1 display an elevated pattern compared to the reference group with two live births. As a next step, we will disentangle the deaths due to different neoplastic diseases and run separate models for them. A clearer pattern is obtained for cardiovascular mortality (Fig. A3), where we find clear differences across parities and a j-shaped pattern. Women with four and more children are particularly likely to die of cardiovascular diseases. For external causes (Fig. A4), we identify contrary to other studies a pattern that deviates strongly from a j-shape. Here, women with three and higher parities display lower mortality risks compared to the parities 0-2. For the interpretation it is important to note that female labour force participation in GDR was quite high and that due to the acute labour shortage many women worked in professions typically dominated by males. As the number of children might have had an effect on labour force participation, women with less children might have been more prone to work or commuting related deadly accidents. Future analyses of information on the place of accident in the GDR mortality statistics will allow us to look more deeper into this. For the remaining causes (Fig. A5), we find again a clear j-shaped pattern. Thus, the attenuated pattern for all-cause mortality seems to be mostly related to deaths due to neoplasm and external causes.

As a next step we will specify a similar model for Sweden based on Swedish register data, allowing us to present at the EPC a direct comparison between East Germany and Sweden. In addition, we will extend our analysis of the GDR data.

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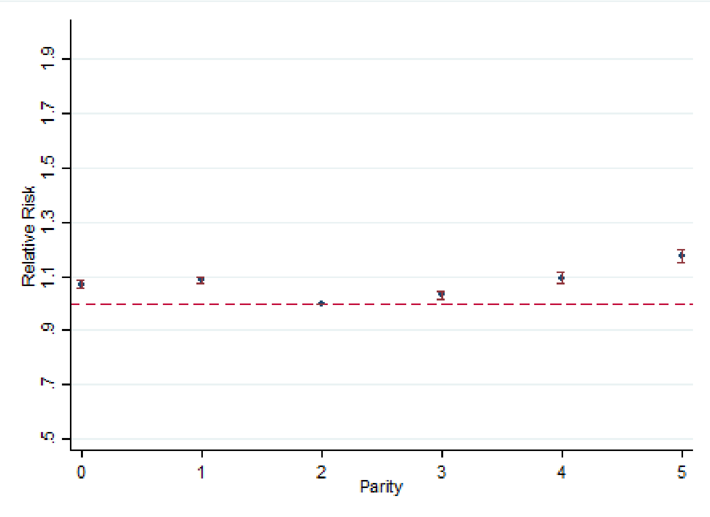
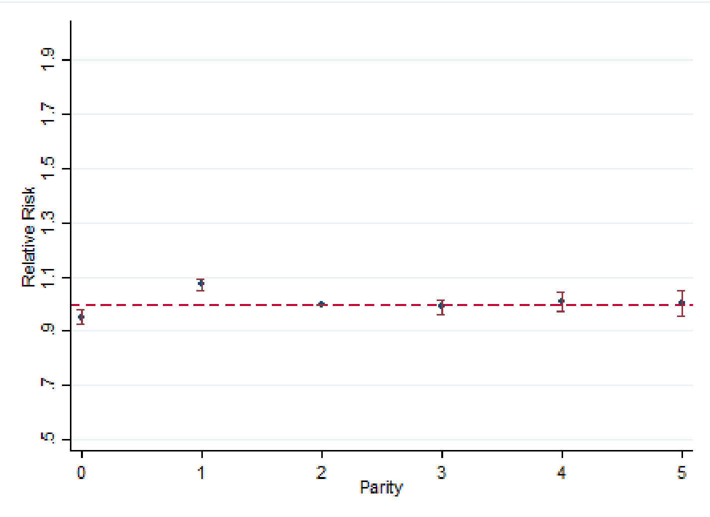
Appendix

Figure A1: Children born alive and mortality (all causes)– East Germany



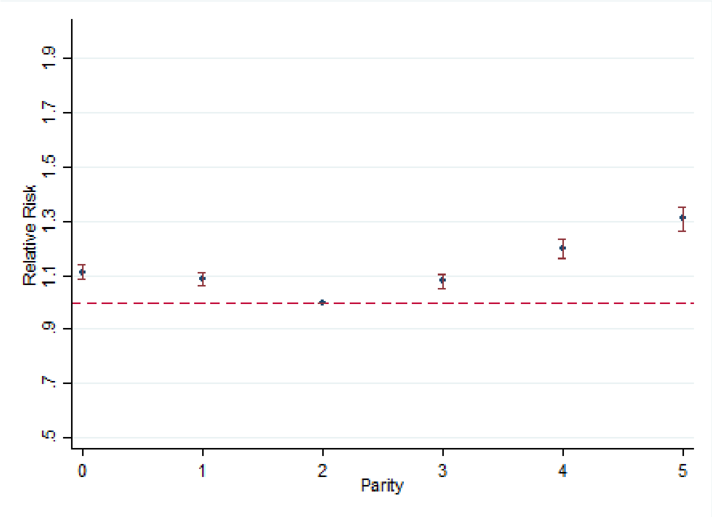
Source: German State Archive, own calculations

Figure A2: Children born alive and mortality due neoplasm – East Germany



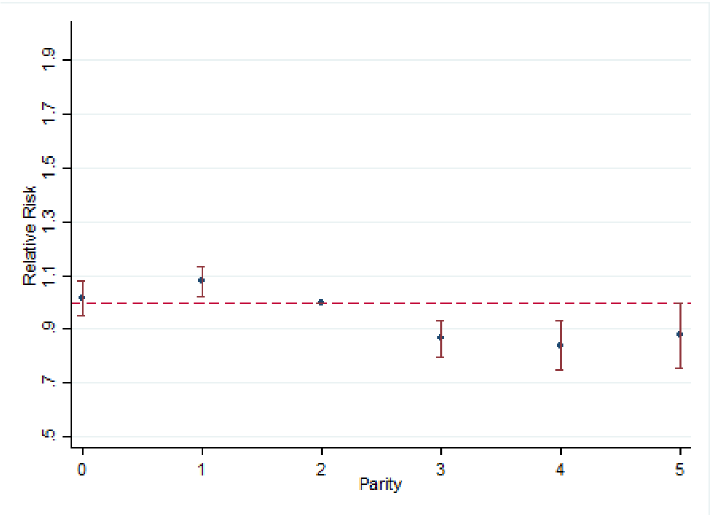
Source: German State Archive, own calculations

Figure A3: Children born alive and mortality due to cardiovascular diseases – East Germany



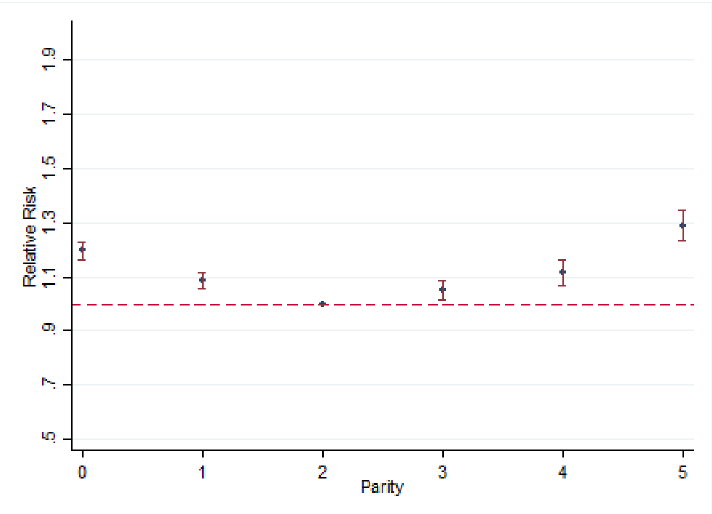
Source: German State Archive, own calculations

Figure A4: Children born alive and mortality due to external causes – East Germany



Source: German State Archive, own calculations

Figure A5: Children born alive and mortality due to other causes – East Germany



Source: German State Archive, own calculations